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VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING.
OFFICIER DU MERITE AGRICOLE (FRANCE).
CAVALIERE DEI S. S. MAURIZIO E LAZZARO (ITALY).
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
AND FORMERLY PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

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"CO-OPERATION."

THE following Limerick is intended to show the attitude of the medical and veterinary professions to one another as it was, is now, and (it is hoped) ever shall be.

There once was a Doctor who said,
"I wish all these ——— 'Vets.' were dead."
But his *confrère* said "Nay—
"You're a long way away,
"Their profession 'twere better to wed."

There was an old V.S. who thought
By the doctors he nothing was taught.
Said his colleague, "What rot!
"From them much can be got,
"And to shun them with danger is fraught."

A doctor went with the V.S.;
Each bent on relieving distress;
For disease had occurred
Both in man and in herd,
And their efforts the public did bless.

D. S. R.

Editorial.

COMPARATIVE MEDICINE.

THE composer of the preceding verses, a worker in the domain of Comparative Medicine, exactly hits the right nail on the head when he alludes to the value of collaboration between the members of the two great branches of medicine, the human and the animal, in the fight against disease. The two are inseparable, and much time has been lost in the past by the want of union which has, sometimes unfortunately due to the carping and ungenerous spirit alluded to in the poet's first two verses, been only too pronounced.

In the past, in this country at all events, there has been no serious attempt made to bring the members of the two professions on to a common platform where they could discuss things of mutual interest, and the fact that the Royal Society of Medicine has now thrown open its doors to the members of the Veterinary Profession, allowing them identically the same privileges which are allowed to the members of the Medical Profession, is a subject for congratulation. That it has found mutual favour is proved by the fact that more than fifty veterinarians have already taken advantage of it, and several papers of mutual interest to both professions have been read during the past Session.

It was with a view to stimulating interest in the Comparative aspect of disease that the British Medical Association initiated a special sub-section of Comparative Pathology at their annual Congress held in Glasgow this year and that the ventilation of the subject has been of decided benefit is shown by the approval with which it has been greeted, not only at the Congress, but subsequently, and in the numerous allusions which have been made to the subject by members of both professions in the Press and elsewhere. The present issue of the VETERINARY JOURNAL is intentionally confined to articles and clinicals bearing on the point, and contains statements of fact which will illustrate to medical men and veterinarians alike the importance of collaboration ; and, moreover, the fact that the protection from certain diseases amongst the patients of the former rests entirely upon the skilled organisation and knowledge of the veterinarian. Once stamped out under veterinary supervision from the animal population, and with proper prophylactic steps against their recurrence, the human crowd can feel secure, as these diseases have their origin with animals and animal sources only. Truly a most powerful argument for the organised collaboration of the two professions, and a seat, too, on the Advisory Board of the Ministry of Health for a veterinarian who has special knowledge of the diseases of animals communicable to man and the means to be taken for their eradication.

XUM

General Articles.

DISCUSSION ON ANIMAL AND VEGETABLE PATHOLOGY IN RELATION TO HUMAN DISEASE.*

By FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
Honorary Veterinary Surgeon to H.M. the King; formerly Professor in the Royal Veterinary College, London.

THE study of animal and vegetable pathology has many points in common with that of the study of human disease, and will well repay a much greater research in the future than has been made in the past.

Members of the medical and veterinary professions have much in common, and to collaborate more closely an interchange of ideas cannot help but be of mutual benefit, not only to themselves, but to the world in general, as the day of the "water-tight compartment" system of opposing the ravage of disease is past, and by progressing hand in hand, much inter-locking of ideas and side-tracking can be avoided, and a more rapid advance gained against the common foe.

The Vegetable aspect of the question is in the able hands of Professor Lang, F.R.S., and in the time at my disposal I shall endeavour to draw your attention to some of the salient reasons which concern animal pathology in relation to human disease.

That there are a number of diseases communicable from animals to man is well-known, but the important part played by the trained veterinarian in preventing this communication has not yet been sufficiently appreciated, and in certain of these diseases the worker on the animal side must of necessity occupy the front trench in order to effectively protect his medical colleagues and their human patients.

We have at the present time in Great Britain at least the following, which are indisputably communicable:—Glanders, Rabies, Anthrax, Tuberculosis, Foot-and-mouth disease, Cowpox, Mange of all animals (horse, ox, camel, dog and cat), Ringworm (especially of the horse, calf, cat and mouse), and certain forms of Seborrhœa (such as blacksmiths contract from handling horses with greasy legs). The *Bacillus abortus* of Bang is also under suspicion as a source of contagion from cattle, and I think that the great prevalence of pyorrhœa in pet dogs (which are kissed by their fair owners and allowed to lick their lips and hands) should be regarded as a possible factor in the spread of that disease in human beings.

Others produced by parasites requiring an animal host in order to make their respective life-cycles complete before they can become

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pathogenic to man, such, for example, being the Echinococcus, the *Cysticercus bovis* (the larval stage of the *Tænia saginata* of man) and *Cysticerus cellulosæ* (the larval stage of *Tænia solium*), the parasites of measly beef and measly pork respectively, and the *Trichina Spiralis* of the muscles of the pig, which give rise to trichinosis in man in countries where ham is largely eaten smoked and not necessarily cooked.

Then, in addition to those which are intercommunicable, we have in animals many diseases which are analogous to those in man—analogous in many ways in symptomatology, in the situations of the body which are attacked, in the ravages set up in the various body organs and in other ways, the knowledge of which sets one thinking, and often deters one from making grave errors of diagnosis and judgment.

Take, for example, the old-time instance of the man with the cirrhotic liver. There was a time when excessive indulgence in alcohol was almost always blamed for this, and the term given, "gin drinker's liver," was a byword. Animals are not alcoholic, and yet cirrhosis of the liver is one of the commonest things observed when making post-mortem examination of old animals.

The study of cancer is equally interesting in animals as in man, probably almost more so, and the situation on which this disease occurs in our respective classes of patients is well worth serious thought when considering the irritation theory.

The knowledge that certain species of animals are refractory (or even completely immune) to certain diseases, is of enormous value to the student of disease problems, and this fact requires a satisfactory explanation, if only it can be discovered. The immunity of the ox tribe to glanders is the best illustration of a disease of this kind.

Why should the ox be immune to glanders when the horse, ass, mule, certain carnivora, and man, fall easy victims to it? There must be a valid reason, and if only that knowledge could be attained, and put into practical shape for purposes of conferring immunity on those susceptible, the fight against glanders would have scored a point—a great point, too—on the side of progress. Then again, one must not forget the danger of the animal as a carrier of disease, so that, to the scientific worker, a knowledge of the habits of the animal in health is as useful and necessary as a knowledge of the symptoms when in a state of disease.

The time is not long enough to take each disease in full detail, as to each one might allot a whole day, and then not exhaust all the comparative aspect, so that it is my intention briefly to bring forward for your consideration the most salient points which affect man and

the lower animals mutually, and particularly emphasise in this category the value of a mutual collaboration between the medical and veterinary professions.

Let me read you a brief paragraph I cut out of a morning paper only so recently as the 6th of last month. A Reuter telegram which was sent from Helsingfors, and came to London *via* Paris, is as follows :

" The *Soviet Red Gazette* announces that the Bolshevist authorities in one of the famine districts, ' for humanitarian and sanitary reasons,' have shot 117 children afflicted with glanders, which developed after eating the flesh of horses suffering from that complaint."

It makes one meditate, safe within this England of ours, what can occur when the laws of Preventive Comparative Medicine are disregarded, and is a striking instance of the value of the trained veterinarian to his medical confrere and the general public.

Glanders and rabies, two of the most horrible diseases which can affect man or beast, show what can be done by organised collaboration of the two professions. Each is primarily a disease of animals, and only comes to man from them.

Let the veterinary scientist eradicate glanders from his patient of the horse tribe, and rabies from the canine race, and neither of these diseases will appear in man ; and I am happy to say that there is every reasonable hope that by the end of this year this will have been achieved in regard to Great Britain. The credit for this important result, which is of equal importance to man and animals, must be given entirely to those to whom it is due, the veterinary advisers (with Sir Stewart Stockman and Sir John McFadyean at their head) of the Ministry of Agriculture ; and so long as we maintain a rigid system of mallein testing and quarantine under expert veterinary supervision, on all animals of the horse tribe before they are allowed to enter the country, there will be no danger of the re-introduction of glanders to Great Britain.

GLANDERS.

I can remember the time when London was so full of glanders that every stable groom, and particularly those in cab and omnibus stables, knew the meaning of the word glanders as well as he knew the hour of his midday meal.

In 1901 (only twenty years ago), some 2,370 horses were destroyed for glanders in Great Britain (1,828 from London alone), whereas the statistics of the Ministry of Agriculture show that for this year, up to the present date, no case has been reported.

The discovery of mallein and the mallein test placed in our hands an infallible method for the detection of glanders, and by its means the disease can within a very short space of time be, with certainty, eradicated.

By its aid, applied by the officers of the Royal Army Veterinary Corps, glanders was kept completely under control amongst the hundreds of thousands of horses and mules in the British Army during the great war; and afterwards some 150,000 were sold to the public with perfect safety; and I believe I am right in saying that in the British Army no case in man was reported during the whole of the war.

Twice have I been present officially in civilian life at the post-mortem examination of men who had died of glanders, and in neither case was the disease suspected by the medical attendant until just before death, one patient being treated for about ten months for chronic rheumatism and the other for chronic pleurisy.

The infection is usually transmitted to man from a glandered horse, ass, or mule, by discharge from the nose, from a farcy-bud, or by contact of an abraded surface with a sponge or brush (stable utensil) which has become contaminated with some of the infectious discharge from a horse or mule. The men most commonly infected are those whose life brings them in contact with horses or with the preparation of glanders cultures, and records in medical journals show the hopelessness of treatment when once the disease has gained a foothold.

I believe I am correct in saying that there is only one man alive in Great Britain at the present time who had been indubitably infected with glanders and completely recovered. I refer to Professor Gaiger, the enthusiastic Principal of the Glasgow Veterinary College, who has published a full description of his own case in the *Journal of Comparative Pathology and Therapeutics*. It is a most fascinating account of a plucky fight against a loathsome and terrible disease, and is of great scientific interest.

It is appropriate that Professor Gaiger should be with us at this meeting to-day, and I am sure that I am expressing the wishes of all of us who are present when I say that we all, medical and veterinary alike, congratulate him and his medical advisers on the successful issue to the gallant fight that was made for his life.

Rabies.

The energetic watchfulness of the veterinary officials of the Ministry of Agriculture had kept Great Britain free from rabies for nearly twenty years, and until some thoughtless person committed the stupid and criminal offence of surreptitiously smuggling a dog (which happened to be infected and in the incubative stage) into the country, the much dreaded disease existed only in name.

The first case was reported in the district of Plymouth about May, 1918, and during 1919 alone some 179 persons were bitten by

animals in the scheduled areas, 46 of them by animals proved to be rabid. Prompt measures were taken, and treatment was arranged by the medical department of the Ministry of Health, and it is a triumphant tribute to the memory of Pasteur that there have been no deaths in England from hydrophobia. Under the present laws the head and neck of the suspected dog are sent to the Veterinary Laboratory of the Ministry of Agriculture, together with as much history as can be collected by the veterinary inspector to whom the case has been reported. The Negri bodies are searched for and inoculation made if necessary, with the result that in 96 per cent. of cases a decision can be given within a few hours, thus saving those who have been bitten much painful suspense and anxiety; and, what is more, enabling the medical officer, if necessary, to advise and immediately commence anti-rabic treatment.

All Continental countries, with the exception of Norway, Sweden, and Denmark, are infected, and although mainly seen in the dog, rabies is also met with in the horse, cow, sheep, cat, fox, wolf, and even the fowl.

In some of these veterinary patients rabies produces a train of symptoms which are rather curious, and which to the laymen may not give rise to any suspicion of the disease, and thus perhaps may lead to disaster.

Everyone knows something about the suspicious signs in the dog, although the classical symptoms are by no means constant. The change of manner, desire to hide in dark places, great excitability, restlessness, snapping at imaginary objects, attempts to chew, and futile attempts to swallow water, and the final rage in the violent forms, or the typically dropped jaw in the paralytic form, are all characteristic of the rabid dog. It is strange, too, what long distances dogs will wander in their unconscious frenzy, and it is for this reason that large areas have to be placed under restriction. The bark becomes changed and the peculiar howl of a rabid dog, once heard, can never be forgotten. Paralysis of the hind quarters and complete exhaustion finally close the scene if the disease is allowed to terminate the poor brute's existence.

A rabid cat is even more to be feared than a rabid dog, as it will attack man and animal in a most reckless fashion; the disease terminates in death preceded by a stage of paralysis of the hind quarters. In the horse and ox one particular symptom which has been frequently observed is a tendency to attempt to bite or rub the scar at the site of infection, whilst in the sheep sexual excitement has frequently been noted.

Until the muzzling order has been withdrawn from every district

it is necessary for both medical and veterinary practitioners to be on the alert for rabies, but there is every reason to hope that before the end of this year this disease, like glanders, will be relegated to its place with those which are only memories and no longer realities. Here again the veterinarian can say that he is of signal service to his medical colleague.

ANTHRAX.

Anthrax has been very much in evidence, both as regards man and animals, during the past few years, and it is time that very much sterner preventive measures were taken against it. As the editor of a professional journal I get cuttings from press agencies all over the country, and it is rare for a week to pass without receiving evidence of its appearance in either man or beast; when it is of sufficient importance for the public press to notice it constantly, one may reasonably surmise that it has become fairly prevalent.

It is a scheduled disease, and Government statistics prove its prevalence in men, particularly amongst those who deal with skin, hides, wool, and hair from abroad; and those who make, or assist at, post-mortem examinations of animals dead of it.

The veterinary practitioner sees the disease most commonly in cattle, although it may be met with in the horse, sheep, pig, and even the dog, although the latter animal is less susceptible than the others.

Bone manure, foreign cake, and other feeding stuffs, obtained from countries where anthrax is rife and improperly controlled, are blamed largely for its appearance amongst stock. It is a troublesome disease and difficult to control, but the precautions of the Ministry of Agriculture have reduced the number of outbreaks very considerably, and if only the disinfection of imported things such as hides, wool, and hair, and even the much abused Japanese shaving brush, can be effectually controlled on entry into the country we shall hear of fewer cases in man. The same may be said in regard to the supply of cotton and other cakes imported into Great Britain as food for cattle.

It is practically always through animals or animal products that anthrax reaches man, so that to stamp it out of the lower animals would mean its eradication from man—a further proof of the necessity for close combination between the veterinary and the human medical professions, and the importance of the study of animal pathology in relation to human disease.

Several communications to be read before the meeting to-day bear on the subject of the intercommunicability of this disease from animals to man, and its seriousness when once contracted.

Sclavo's serum, the sheet anchor in the human treatment, is useless for the animal, and both in horses and cattle this disease still

holds its own as one of the most rapidly fatal, for the patients of the veterinarian, of all the microbial diseases.

TUBERCULOSIS.

If there is one disease more than another to which attention is to be drawn as an instance of the importance of animal pathology in relation to human disease, it is tuberculosis. To medical men and veterinarians alike it is one of the most important and devastating diseases of the day, and when one reads statements that no less than 85 per cent. of the cases of tuberculosis of the glands of the neck occurring in children are of bovine origin, that over 10,000 children die annually from drinking tuberculous milk, and that we have fully a million tuberculous cattle in Great Britain, it makes one shudder and wonder what our sanitary advisers and sanitary legislators are doing.

One scarcely ever picks up a daily paper without reading some statement or other about tuberculous milk, and I cannot understand why the Cattle Tuberculosis Order, which was really making headway in 1914, and was temporarily suspended during the war, has not been re-established.

The report of the Medical Officer of Health for the City of London (Dr. W. J. Howarth) for 1921 states that out of 50 consecutive samples of milk purchased in the City no less than one in four proved to be tuberculous ; and Dr. Bigger, at the last meeting of the Statistical and Social Society of Ireland, asserted that 6 per cent. of all deaths from tuberculosis were due to drinking tuberculous milk.

Does it not seem astonishing that such a state of affairs can exist in Great Britain, the richest and most sanitary country in the world ? Yet we do not move, although it costs us 10,000 human deaths annually, and the loss of many hundreds of thousands of pounds to the agricultural and dairying communities.

Surely it is time a move was made to enforce that milk, when sold, should be clean and free from tubercle, and, if it is not asking too much at this, my first appearance before you, I would like a resolution to go up from this meeting in similar terms to that which was unanimously passed at the combined meeting of the Royal Society of Medicine and the Central Veterinary Medical Society, on the proposition of Sir John McFadyean, in March last, namely :—

" That the prevalence of tuberculosis in cattle in this country continues to be a serious menace to the health of human beings, and that to counteract this danger the reintroduction of the Animals Tuberculosis Order, which was suspended in 1914, is urgently needed."

Given a free hand, we of the veterinary profession could stamp out tuberculosis of cattle in the same way as we have stamped out

glanders and rabies. It would take time and would cost money, but the saving of the suffering and misery entailed by the loss of 10,000 human lives annually would more than counterbalance that, and surely should weigh down the right side scalepan. Money ought not to count where human life is at stake. Having done our part, it would then rest with us to see that this bovine scourge never again got the upper hand, and was relegated to the same position as is now held by glanders and rabies. By doing so we should have again proved the value of having worked together, as opposed to the plan of separate and watertight compartments.

At the present moment a method of immunisation of calves, introduced by Dr. Nathan Raw, is on trial, but it is too early yet to say anything about its results. Should it prove successful, it will be one of the greatest boons ever conferred upon the agriculturist, and, through agriculture, to mankind, for it will materially help to abolish this dire disease from the country.

Foot and Mouth Disease.

Although mainly a disease of cattle, sheep, and pigs, foot-and-mouth disease is of importance because of the risk of the milk for mankind, especially for children. For the moment it has gained a footing in Great Britain, and has cost the taxpayer already about a million pounds. A few instances have been reported of contagion to man, but in reality, owing to the strict quarantine and stamping out methods of the officials of the Ministry of Agriculture, the disease has not had much opportunity to spread in this direction. Beyond, therefore, alluding to it in passing, and making the statement that it is one of the most insidiously contagious diseases of cattle which we have to deal with, I will not dwell upon it now. Some indication as to the extent to which it will spread may be gathered from the statement that in 1892 in Germany no fewer than 1,504,299 cattle, 2,193,157 sheep, 17,782 goats, and 438,362 pigs, were affected.

Cow Pox.

This disease, too, I propose to pass over with a mere allusion, as it has, since the time of Dr. Jenner, received such widespread publicity that its position is definite, and everyone, whether medical man, veterinarian or agricultural herdsman, knows full well its importance in animal pathology in relation to human disease. It is highly infective from cattle to man, and although its course in man is tolerably benign, yet it is one of those little things which we would rather be without.

Mange.

The horse, the cow, the camel, pig, dog and cat each has its special variety of parasite, and it only needs a certain length of time in

contact with the skin of man for the acarus to change his residence. Three varieties of parasite are found on the horse, a sarcopt, a psoropt, and a symbiote, the two former being those which most commonly transfer themselves to man.

Grooming a mangy horse is risky, and riding one is almost certain to transmit the ailment. Knackermen are frequently infected when employed in skinning mangy horses; and a recent case reported in the *Lancet* by Mr. A. S. Macdonald, B.Sc., M.R.C.V.S., proves that the veterinary student is by no means immune. The circumstances were a little peculiar, and worth relating:—

"A class of veterinary students were engaged in performing post-mortem operations on a horse. The horse had generalised sarcoptic mange, and was very badly affected. It was destroyed one Saturday morning at 10, and thereafter was left lying upon a concrete floor while the students in question palpated, dissected, and operated upon the carcase for a period of time which varied with the individual from two to five hours. Of the students who had any contact with the carcase in question, approximately 53 per cent. became infected. On the other hand, the non-infected individuals were either those who were engaged upon the head and neck (which parts had been cured by the previous treatment) or those who had been little more than onlookers, in that they had been engaged in swabbing incisions, etc., to assist the actual operators. In short, of these students whose hands and clothing came into direct and prolonged contact with the infected carcase 100 per cent. complained of subsequent symptoms.

"The most constant symptoms common to every case were:—

"(*a*) Itch of a most pronounced and continuous nature, accentuated by surface warmth, induced by exercise, by lying in bed, and by friction in the process of inunction of the affected areas.

"(*b*) A papular eruption. This was present in all the affected cases at the site of contact with the carcase—*i.e.*, forearms, ankles, and calves of the legs. The hands in most cases, though not in all, escaped infection, no doubt owing to washing with carbolic soap immediately after, or in some cases during the work on the dead subject. In some cases the forearms escaped while the ankles were affected or *vice versa*. Lesions on the shoulders, upper arms, trunk, and thighs occurring in some of the students were in all cases secondary, there being no direct track of infection on the skin. The papules were the size of a large pin's head, of a fiery-red colour, and were slightly elevated above the surface of the surrounding skin. They seemed to correspond to hair-follicles, and the crops were luxurious. It is perhaps significant that in one the interdigital spaces were the seat of the infection; here also the papules were more circumscribed, more elevated, and slightly pointed.

"Treatment was troublesome, consisting mainly of hot baths and the after application of sulphur preparations, and eventually all made a complete recovery."

In Great Britain, mange in the horse is a notifiable disease, and must be reported to the Authorities, but mange in the dog is not.

That mange in the dog and cat is transmissible to man does not seem to be so generally known in the medical profession as it should be, and some time ago Dr. Whitfield and myself published the histories of some seventeen cases, in which he confirmed the existence in the human subjects, and I in the dog.

In a canine clientele, one frequently gets a person with an itchy dog who complains of an irritable skin, and in a very high proportion of cases, if the dog has mange, the owner will have contracted it. Small vesicles are produced, scattered over the surface, and not in grouped lesions. The intense irritation leads to scratching, and the consequent decapitation of the little vesicles, and their original site becomes covered with a serous or a blood scab. If left untreated, the canine sarcopt will live on the human subject for about six weeks, but, if recognised and treated, I understand that it is easily got rid of. Several communications upon this subject will be presented to you by others interested in the comparative pathology side of the question.

Ringworm.

All the ringworms of animals are contagious to man. Every cowman knows of the risk he runs when dressing calves, or cattle, suffering from this complaint, and the ringworm of the horse is also contagious. The man who gets infected with either, does so with his eyes open, but in the coat of the domesticated cat there lurks an unexpected danger whigh might not occur to one to suspect, did one not know. The cat's hair can be a carrier of ringworm spores without necessarily becoming infected to a sufficient extent for an owner to see it. In fact, it may escape the attention of the medical attendant and veterinary attendant alike for a considerable time ; to fix this upon your attention, I shall ask you to take a note of the report of a case of transmission of ringworm from a cat to some children, which will be read to-day by Mr. E. Livesey, M.R.C.V.S., in detail :—

" Briefly, the facts were that Mr. Livesey was asked to examine a young cat, in regard to the presence or absence of skin disease. He failed to find anything, but within three weeks developed *Tinea iclrcinata* on the left wrist, several other places following later. His wife, too, developed lesions. The owners of the cat developed it, as also five other persons in the house of a friend to whom it was given as a present. Further microscopical examination of the hair of the coat behind the ears revealed *Tinea* spores, and the source of the infection was thus explained."

Measles, Trichinosis, Etc.

To the diseases found in meat I propose to do no more than allude, as they in themselves would form a separate paper of great importance. Suffice it to say that they play their part in the category covered by

the title of the paper, in that they come under animal pathology in relation to human disease. Their presence furnishes a plea for proper and efficient meat inspection, the general neglect of which in England is deplorable.

It is entirely owing to the fact that we cook our food well that we enjoy our freedom from diseases where a portion of the life history must be spent in an animal and part in man, a further tribute to the necessity for the study of comparative animal pathology.

CONCLUSION.

In conclusion, I desire to congratulate those of the committee who selected as the title for the discussion, "Animal and Vegetable Pathology in Relation to Human Disease," for its part is an important one, and there are numbers of diseases which are intercommunicable and analogous. It behoves us to work together, to exchange ideas, and to work in unison, for by doing so we shall hasten forward the good work which is being done daily in the combat against disease.

SOME ASPECTS OF VEGETABLE PATHOLOGY IN RELATION TO HUMAN DISEASE.*

BY PROFESSOR WILLIAM H. LANG, F.R.S.

DIRECT comparisons between the normal development and construction of plants and animals have often proved more misleading than helpful, and it is even more necessary to be on guard against false analogies when the comparison is extended to pathological processes. The common features of all living things justifies the attempt, but it is well to maintain a critical rather than an optimistic attitude.

Evolutionary history shows that the connection between plants and animals lay very far back, and is particularly indirect for the higher animals and the higher plants. Pathological reactions and processes have a similarly long history behind them, though we can hardly hope to get more than occasional records of them from the fossils. If we could compare the reactions, for instance, to wounding, in the earliest vertebrate animals and the earliest land plants we should doubtless find them as dissimilar in essentials as those of a man and a flowering plant to-day.

Some ancient plants recently found in the Old Red Sandstone of Scotland afford the earliest examples of pathological reactions of the tissues of plants that I know. These plants had, like other land plants, an epidermis with minute openings on stomata through which

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gaseous interchanges between the air and the internal atmosphere in the intercellular spaces took place. Noxious gases, perhaps the result of volcanic activity in the neighbourhood, appear to have sometimes entered the stomata, stimulating the cells around and underneath to enlarge and divide. The interest of the small projections of tissue thus produced lies in their remarkable similarity to the intumescences formed in some living plants when exposed to irritating vapours. The resemblances of the pathological reactions of these Devonian plants and those of the present-day do not stop here. When the unknown cause had led to the necrosis of a portion of the tissues of the stem, the adjoining living cells reacted by enlargement and repeated division to the presence of the necrosed mass or the wound left by its decay and disappearance. The result in some cases is as beautiful an example of wound-callus, progressing towards the obliteration of the cavity and the healing of the wound, as can be obtained from living plants. The perfection of the preservation of this, the most ancient wound-reaction that is known, is of interest for its own sake, and will serve as a starting point for some general consideration on reactions of vegetable tissues to irritants and parasites.

Even from this example it will be obvious that a general correspondence can be traced between the healing of a wound in the plant and animal body. If, however, we were tempted to make more specific comparisons—for instance, between the processes of the wound-callus and the projections of granulation tissue in an animal wound—we should probably get astray and pass from scientific study into regions of fancy.

The same general conceptions arise in the study of diseases of plants and animals, and the same names, such as wound-reactions, parasitic diseases, and tumours, are naturally used. The interest of comparison in all these cases has long been recognised by human pathologists, though it can hardly be said to have been actually useful.

Of late years very direct comparisons have been made between a remarkable disease of plants known as " crown gall " and malignant tumours in man and animals. It will afford the necessary limitation to the scope of my remarks if they are made to bear on the consideration of this disease and of these comparisons. I venture to do this, since I have had the advantage of being in close touch with a study of crown gall which Dr. Wilfrid Robinson and Mr. H. Walkden have been making in my laboratory. Without anticipating their results, which will shortly be published, this will enable me to present some of the problems suggested by the published accounts of this disease in a form that may be of use in this discussion.

The tumour-like growths of crown gall have long been known,

especially in relation to wounds in cultivated plants from horticultural operations such as grafting. The disease was proved to be transmissible from one plant to another, and was later shown by Smith and Townsend to depend on a bacterium which they successfully isolated and named *Bacterium tumefaciens*. The causal organism having thus been obtained in pure culture, the experimental production of the disease has been extensively carried out, especially by Erwin Smith. We owe much of our knowledge of crown gall to his papers, which contain a wealth of illutration by excellent photographs of the varied effects of the introduction of *Bacterium tumefaciens* into a number of different plants.

Bacterium tumefaciens is a rod-shaped bacillus with rounded ends, 1.2 to 1.5 μ long by 0.5 to 0.6 μ broad, and motile by means of one, or occasionally two or three, polar flagella. Its cultural reactions have been fully studied by Smith, and, as independently isolated in this country, by Walkden. Its regular occurrence in relation to the crown-gall tumours has been proved bacteriolgically by obtaining from them pure cultures of the organism which can again cause the disease.

The main features of the growths caused by this bacterium may be briefly stated. There is no evidence that infection occurs except by a wound, though a needle-prick is sufficient. The galls have been obtained on roots, stems, and leaves of many plants, attaining the largest size when the inoculation affects immature tissues or the cambium of stems with secondary growth. Especially large tumours form on parts with very active and anomalous secondary thickening, such as the root of the sugar beet. What have been distinguished by Smith as secondary tumours appear in some cases at a distance from the main tumour. When the inoculation is made into apical or axillary buds the further growth of these is profoundly disturbed, and irregular growths bearing more or less altered organs (leaves, shoots, flowers) result. Definite organs of the plant may also appear on tumours apart from pre-existing rudiments. Thus roots develop in the condition known as " hairy root," and shoots when inoculations have been made on the cut surface of a young internode, into the internode of a stem, or into the midribs of a young leaf.

The tissues of the gall or tumour, resulting from the stimulation of unknown nature exerted by *Bacterium tumefaciens* on the more or less immature part of the host plant, show an abundant irregular multiplication of cells. Some of the resulting meristematic cells undergo differentiation into mature tissue elements, especially into those of an irregularly arranged wood. Others may form the starting point for the adventitiously developed organs (roots, shoots) mentioned

above. The published figures show that the effect may extend back some distance from the inoculated surface in the vascular bundles. Smith holds that there is an actual infiltration of the tumour cells between the normal cells of the tissues around, and explains in this way the origin of the secondary tumours connected by tumour strands with the main tumour.

On the ground of such facts as have now been summarised, Smith makes detailed comparisons with malignant tumours of man and animals, and also treats the production of new organs in crown gall as comparable to the embryomata and teratomata of the animal pathologist. Further observations and comparisons on these lines have been made by Jensen, both by inoculating crown-gall bacteria into beets and also on certain tumours of this plant from which it is not clear that *Bacterium tumerfaciens* can be obtained. Jensen has successfully transferred the latter tumours by grafting between yellow and red forms of *Beta* ; these grafts show little indication of any real infiltration of the normal tissue.

In attempting to form a critical estimate of this disease, and of the comparisons that have been made between it and pathological processes in man, we must take into account the normal construction and mode of growth of the affected portions of the plant as contrasted with animal tissues ; the reactions to wounding in plants ; the reactions of the plant to various parasitic organisms ; and the relation of tumour formation in the plant to wounds and parasites. It will be found that these problems are connected, and that collectively their consideration puts us in a better position to appreciate the reactions of the vegetable tissues to the crown-gall bacterium.

The absence of a nervous system, and, still more important, of anything corresponding to the circulatory system of the higher animals, must always be kept in mind when considering disease reactions in the plant. Along with the absence of blood and lymph we must note the special type of the tissues in plants due to their being composed of cells with the protoplasts enclosed by cell walls. Another important difference from the higher animals is found in the continued development of most plants. The formation of new tissues and organs continues throughout life at the growing points of the stems and roots. The enlargement of the parts thus laid down, and the separation of such organs as the leaves of the bud, takes place as their cells become vacuolated in attaining their mature size and condition. In addition to the activity of the primary meristems at the growing points a continued production of new tissues proceeds from layers of meristematic tissues within the plant. The most

important of these layers is the cambium between the woods and the bast, to which secondary thickening is due.

Many of the features of the reactions in crown gall depend on these general characteristics of growth and construction in the plant. A point to which attention may be specially directed is that the distance over which the effect of an inoculation is manifest may be almost entirely due to the subsequent enlargement and separation of the parts as the bud expands into a shoot. This will be seen to have an important bearing on the distance separating the secondary from the main tumours.

The condition of correlation between the parts of the whole organism controls in the plant, not merely the balance of the mature tissues, but the production of new organs and the arrangement of these and of their tissues. This correlation becomes evident when it is disturbed in any way, and plays an important part in the pathological reactions to wounds or parasites. The removal of parts of the plant—for instance, of the terminal bud—may so alter the balance of the whole as to cause dormant growing points to become active or others to change their reaction to the environment.

When the tissues are relatively mature there may be little reaction at the wound itself, save some drying of the surface or the production of a protective layer of cork. In other cases a marked alteration of growth indicates the disturbance of the normal correlation of the tissues. This is best seen when the latter are immature, but wounding may lead to a rejuvenation of the adjacent living cells even when these form a mature tissue. Thus, in the wound reactions of stems of dicotyledonous plants living cells of the cortex and pith proliferate to form a new growth of wound-callus, but the main development of this is from the meristematic layer of the cambium. The effect may extend some distance back from the wound, and the callus itself may not only close the wound, but may become the seat of new growths such as shoots or roots. The cells of the callus become organised as permanent tissue, which often has an irregular or a typical arrangement, as is best seen in the characters of wound-wood.

A number of the features of crown gall will thus be seen to be paralleled in wound reactions of plants. The causal influence of *Bacterium tumefaciens* is, however, shown by the fact that callus-like galls of considerable size develop where there would otherwise be only a relatively slight wound reaction in the particular plant.

The tissues of the normal intact plant are free from foreign organisms except in certain cases of symbiosis, which for our present purpose can be grouped with parasitic diseases. The effect of intrusive parasitic organisms differs in accordance with the specfic nature of

both host and parasite. There may be little or no evidence of reaction on the part of the host; this is especially the case when the affected parts are relatively mature. Marked reactions are usually associated with incompletely differentiated tissues or with meristems, whether primary or secondary.

The numerous new growths or galls on plants due to parasitic animals can only be mentioned without entering into details as to their variety. They always involve more or less wounding, but the effect of the secretions and excretions of the animal parasite in the gall is predominant. A detail of some interest to animal pathologists is the production of multinucleate giant-cells in relation to the presence of parasitic eel-worms in the roots of various plants, in other galls, and in crown gall itself. The common oak-apple may be mentioned as one example of insect galls on account of the similarities which it, like some specimens of crown gall, shows to the development of wound-callus on the end of a cut stem. In this case the terminal bud of the oak is, in fact, considerably wounded by the gall-insect before she lays her eggs. The further callus-like growth which encloses these in the soft tissues of the gall is mainly due not to the wounding but to the irritation of the parasites.

Marked reactions to parasitic organisms without the complication of wounding are found in the case of vegetable parasites. Striking examples are afforded by the wart disease of the potato, where axillary buds are affected by *Synchytrium endobioticum*, and by club-root, where the cambium and secondary tissues of the cabbage or turnip are stimulated by the presence of *Plasmodiophora brassicae* within the cells. The alterations of form of the host-plants due to uredineous fungi affecting the primary or secondary meristems or immature tissues can be contrasted with the relatively slight reactions due to similar fungi affecting more fully grown stems and leaves. In some cases, as in certain fern leaves affected by Exoascaceae, new leaf-like growths result from the presence of a fungus.

Many bacterial diseases of plants are of the nature of "rots" with little or no reaction, but in the bacteriosis of the olive-tree we find irregular tumour-like growths with the causal organism evident in cavities. The well-known root-tubercles of the Leguminosae afford another example of a marked reaction due to the intrusion of a bacterium, the presence of which is in this case beneficial to the host.

In the various cases of irritation by animal or vegetable parasites resemblances to crown gall are evident. This is, of course, not surprising, since we know that this disease is due to the influence of a parasitic bacterium.

Tumour-like growths in plants are in many cases, as will be evident from what has been said above, the result of the stimulation due to parasitic organisms. Others are due to wounding or are associated with the wound-callus formed as a reaction to this. Some of the globular woody tumours found in the cortex of trees are of this nature, the wood developing from layers of cambium formed around groups of cells of the bark. Other tumours, superficially like these, have their cambium derived from that of dormant buds which may lose their connection with the wood of the trunk. The latter examples have long been recognised as giving a point of comparison in plants to Cohnheim's explanation of the origin of animal tumours. True tumours, apart from wounding or the presence of parasites, are, however, rare in plants, and comparison with animal tumours is thus limited. In all tumour-like growths in plants the tissues are liable to be more or less atypical in their histology.

In the light of this brief survey of some other pathological reactions in plants crown gall appears as a particular case of a callus-like tumour growth following on the introduction by a wound of *Bacterium tumefaciens*. There is no doubt that the resemblances between the appearances presented by sections of some of the tumour-like growths in this disease and animal tumours are striking and may well interest the human pathologist. To what extent even in the case of this particularly favourable plant disease it is wise, safe, or useful to make specific comparisons with particular pathological processes in man is, however, open to discussion.

How closely the comparisons between crown gall and malignant animal tumours have been pressed can be seen by reference to Erwin Smith's papers and his recent *Introduction to Bacterial Diseases of Plants*.

The importance and interest of the pathological processes in crown gall fully justify their comprehensive study, which we owe so largely to the work of this investigator. It does not appear possible, however, to accept on the evidence before us all these direct comparisons with malignant tumours in animals, nor to draw conclusions as to the etiology of the latter from the undoubted facts as to *Bacterium tumefacions* being the cause of crown gall.

The cell-multiplication and the imperfect differentiation of the resulting tissues have been seen to be common to a number of disturbed growths in plants. The tendency to a production of new organs from the crown-gall tumour is paralleled in the case of wound-callus, galls, and some parasitic diseases of plants. There is real danger of being misled by a name if we speak of these new growths in this plant as teratomata or embryomata. In regeneration in plants the

formation of a complete plant from a somatic cell or group of cells is common. The conception of embryomatous tumours in animals involves the early distinction of the germinal layers and of somatic and reproductive cells ; there is no strict parallel to this in plants.

Passing from these more general features to the peculiarities of crown gall which may have been made the ground of special comparison with malignant tumours we find that some of the more critical facts are uncertain and in need of reinvestigation. One of these concerns the actual place occupied by the bacteria in the crown-gall tumour, from which there is no doubt they can be obtained. In earlier accounts Smith figured bacteria in small numbers in the cytoplasm of the tumour cells. More recently he has stated that the bodies thus demonstrated are not bacteria. He still, however, assumes that bacteria are present within the cells, and are there liberating products which lead to the tumour growth. As the matter stands there seems no evidence for arguing from crown gall in support of intracellular parasites in malignant tumours. The uncertainty as to the position of the bacteria in the active tumour evidently bears on the further hypothesis of Jensen that the bacteria may disappear, leaving the cells with the abnormal type of growth impressed upon them.

We thus come, as the real ground for comparing crown gall with malignant animal tumours, to the power of intrusion of the tumour tissue into the normal tissues of the plant and of there producing secondary tumours at a distance. The question of actual intrusion, as distinguished from extension of the morbid process to adjoining cells, requires critical reinvestigation. There is no doubt as to the existence of what have been termed secondary tumours, connected with the main tumour by a more slender strand of tumour tissue. It is by no means clear, however, in what sense or degree these represent intrusions, and a fuller explanation of their mode of origin is required, due allowance being made for the extension of the parts by growth from their condition at the time of infection.

One feature of the secondary tumours in the leaf on which stress has been laid is that they appear to repeat the structure characteristic of the stem, where the main tumour is situated. The radial arrangement of the vascular tissues in the secondary tumour and the tumour strand does not, however, appear to involve this interpretation. It cannot be taken as corresponding to the repetition of histological characters peculiar to the primary tumour in secondary malignant tumours in the animal body.

Crown gall, as one of the plant diseases most fully studied from this point of view, thus appears to bear out the apprehension expressed

at the outset as to the soundness of detailed and direct comparisons between particular diseases in animals and plants. Doubtless, as our knowledge of normal protoplasm increases, and as pathological processes are traced back to changes in the cells and their protoplasm, fundamental common features of disease in plants and animals will become more and more evident. Though this aspect of the subject cannot be pursued here, it is of interest to note that Erwin Smith's studies of crown gall have led him to consider and experimentally attack such general underlying problems.

It will evidently be advantageous for a student of plant pathology to study some animal diseases, and conversely for a human pathologist to pay attention to some diseases of plants. Such studies must, however, always be conducted in the light of the differences in morphology and physiology which characterise animals and plants. The value of taking plant diseases into consideration in human pathology (and in passing one may add of including some plant pathology in the education of the medical student) comes rather from this widening of outlook than in the form of direct inferences from the one subject to the other. To the philosophical human pathologist the study of some plant diseases may well be light-giving, and it is perhaps better not to expect it to be fruit-giving.

Et lucifera experimenta, non fructifera quaerenda."

TUBERCULOSIS AS AN ANIMAL DISEASE COMMUNICABLE TO MAN.

By ARTHUR GOFTON, F.R.C.V.S.,
Chief Veterinary Inspector to the City of Edinburgh.

It is beyond doubt that in Great Britain tuberculosis is the most serious of the transmissible animal diseases on account of the number of its human victims as well as the character and effects of the illness to which it gives rise in them. Further, as compared with some of the other transmissible diseases, the risk of contracting tuberculosis from animal sources is not special to any class of the community, but is shared equally by all classes, who may contract the disease through the agency of food in the shape of meat or milk derived from affected animals. Nevertheless, it is very desirable that the risks should not be overstated, but rather that a fair and reasonable measure of them should be taken as far as the facts available will permit of this being done. In particular, it is desirable to emphasise that the danger arising from the consumption of meat derived from tuberculous animals is relatively small, and under an efficient system of meat inspection negligible, as compared with milk, which is a much more potent factor in the transmission of bovine tuberculosis to the human subject.

It is generally accepted that from 6 to 7 per cent. of human tuberculosis is attributable to infection from bovine sources, and in the following remarks an attempt is made to show the extent to which tuberculosis prevails in animals in forms in which either the meat or the milk, if consumed by man, would constitute a danger of communicating disease. The figures given are based on an analysis of the meat inspection records of the Edinburgh abattoirs for the last three years.

The available records of tuberculin testing and of meat inspection are too small in number to permit of a reliable general estimate of the extent to which tuberculosis prevails in the cattle of Great Britain. It is, however, usually estimated that approximately 40 per cent. of dairy cows are affected with tuberculosis in some degree, and, as will be seen from the appended table showing the incidence of tuberculosis in the different classes of stock passing through the Edinburgh abattoirs our experience supports this estimate.

TABLE I.—SHOWING INCIDENCE OF TUBERCULOSIS DURING YEARS 1919-20-21, IN PERCENTAGES.

	1919.	1920.	1921.	Average.
Cows	35·99	34·64	57·52	39·99
Other Cattle	2·95	4·24	3·45	3·58
Cattle (all classes)	9·98	7·30	7·70	9·07
Calves (under three months) ...	0·02	0·05	0·07	0·04
Swine	3·72	4·54	6·31	4·92

In the past the dangers associated with the consumption of meat from tuberculous animals were overstated, and there is still a tendency in some quarters to take an exaggerated view of the risks. It is, however, generally recognised that bovine tuberculosis is mainly a localised disease, and that so long as it remains localised, and is not a cause of emaciation, the carcase of an affected animal may safely be passed for human food provided the diseased centres, together with sufficient of the contiguous parts to provide a margin of safety, are removed and destroyed. This is the procedure consistently followed in practice, and if it be correct in regard to the carcase on which there are localised centres of disease, its applicability to the case in which the disease is confined wholly to the viscera is more obvious, provided always that the viscera do not themselves show evidence of generalisation. Reference to Table II will show that, taking all classes of animals passing through Edinburgh abattoir during the last three years, the disease was confined to the viscera (inclusive of the glands of the head) in over 75 per cent. of those affected with tuberculosis, and that disease of the localised type affecting parts of the carcase along with the viscera constitutes over 90 per cent. of the cases.

The carcase of an animal affected with generalised tuberculosis, or which is emaciated as a result of tuberculosis, is admittedly unfit for

food. It is possible that the danger associated with consumption of the flesh of a well-nourished animal affected with generalised tuberculosis is less than that generally attached to it, but it is a danger which cannot be ignored. It will be seen from Table II that the generalised case constitutes only a small proportion of the total cases of tuberculosis. (It may be advisable to state here that the term generalised tuberculosis is used to include all cases which would be classified as such according to the recommendations contained in the reports on meat inspection recently issued by the Scottish Board of Health and the Ministry of Health.)

TABLE II.—SHOWING PERCENTAGE OF CASES OF TUBERCULOSIS IN WHICH THE DISEASE IS GENERALISED AND LOCALISED.

	Generalised.	Localised. (Carcase and Viscera).	Viscera only. (including heads).	Head Glands only.
Cows	8·44	91·56	74·63	—
Other Cattle ...	3·52	96·48	81·37	—
All Cattle ...	6·85	93·15	76·85	—
Swine	5·73	94·27	81·86	70·83

Bearing in mind the recommendations of the Royal Commission on Tuberculosis that, owing to the greater tendency to generalisation, the carcase of a pig which is affected with tuberculosis in any position or in any degree should be condemned, it is of interest to note that cattle, and in particular cows, show a higher percentage of generalised tuberculosis than swine. The tendency to generalisation more rapidly and at an earlier age in the pig as compared with cattle is admitted, but pigs are slaughtered at a much earlier age than the average bovine animal, and very much younger than cows, and the figures merely show that the majority of pigs which are affected with tuberculosis appear in the slaughterhouse before the disease has become generalised. Reference has been made specially to this point to show that the recommendation of the Royal Commission applied consistently in the judgment of the carcases of pigs affected with tuberculosis would entail the destruction of a large amount of useful food which could with safety be passed to the consumer, and also to illustrate that the practice, now almost universally followed, is justified of judging the carcase of a tuberculous pig according to the same standard as is applied to a bovine carcase. It is, however, desirable to state that judgment should in no case be passed on the carcase of a pig in which tuberculosis is found to exist until the whole of the viscera with their associated lymphatic glands have been examined, as well as the carcase lymphatic glands, the ribs, the vertebræ, and the sternum. Without this extended examination it is impossible for the meat inspector to form an opinion as to the extent to which the disease has spread, or on which he can, with safety to the consumer, base his judgment.

Milk is of much greater moment than meat as a medium by which

tuberculous infection is communicated from animals to man. Three types of case are responsible for infection of milk with tubercle bacilli, and their importance and frequency is in the following order, *viz.*: (1) The cow with tuberculous mastitis; (2) the cow affected with generalised tuberculosis, and which manifests no clinical evidence of disease in the udder; (3) the cow affected with tuberculosis, but which retains the appearance of health, and in which the disease cannot be detected by the ordinary clinical examination. Dealing first with the third type, it may at once be said that the number of animals which fall into this group is small. From time to time cases come under our observation; last year there were four. If the opportunity of making post-mortem examinations of these animals had arisen it is possible that they would have been grouped with the generalised cases. It would, however, appear to be unwise to assume that they represent cases of generalised tuberculosis. It is not an uncommon experience to find cows affected with tuberculosis of the udder in which the disease has a very limited distribution throughout the carcase and viscera. In some instances it has been our experience to find the disease confined to the mesenteric and supramammary lymphatic glands, along with the udder. Further, a cow which shows definite lesions of tuberculosis in the supramammary glands in the absence of recognisable lesions in the udder must be regarded as at least a potential eliminator of tubercle bacilli. Rather more than 1·5 per cent. of cows affected with tuberculosis show such lesions, and the disease is generalised in only half of these animals.

The number of cows affected with generalised tuberculosis which eliminate tubercle bacilli in the milk in the absence of clinical evidence of disease in the udder cannot be estimated on the facts available to the writer, but their number is probably small, and it is certain that every cow affected with generalised tuberculosis does not eliminate tubercle bacilli in the milk. When infection of milk has been definitely traceable to a cow affected with generalised tuberculosis our experience has been that the animal concerned presents a clinical picture which leaves no room for doubt as to her condition. Either emaciation is present, or there is definite history of rapid loss of condition, and, as a rule, expectorate is obtainable for microscopic examination in confirmation of diagnosis. It is our practice in the actual work of inspection to deal with these animals when found in a dairy byre as though they were proved sources of danger, and their immediate removal from the herd is ordered.

The cow affected with tuberculosis of the udder is mainly responsible for infection of milk. It is often stated that milk from a large herd in which there is a cow affected with tuberculosis of the udder is likely

to be less dangerous than that from a small herd owing to the greater dilution of infection which results from mixing. In Edinburgh at least the practice of mixing the whole of the milk from a herd does not prevail, and so far as dilution is concerned the milk from the small and the large herds is on the same footing. The incidence of tuberculosis of the udder is shown in the following table :—

	In Total Cows Slaughtered.		In Cows Affected with Tuberculosis.
1919 ...	1 in 227 or 0·44%	...	1 in 82 or 1·22%
1920 ...	1 in 247 or 0·40%	...	1 in 85 or 1·17%
1921 ...	1 in 147 or 0·68%	...	1 in 84 or 1·19%
Average	1 in 201 or 0·50%	...	1 in 83 or 1·20%

The average for the three years shows that tuberculosis was generalised in 47 per cent. of these cases in which the udder was the seat of tuberculous mastitis.

The system of dairying which prevails in Edinburgh entails constant change in the cow population. Practically the whole of the cows are stall fed. They are bought in newly calved and sold out fat to the butcher as soon as they cease to produce a profitable quantity of milk. It is impossible, therefore, to make an accurate comparison between the incidence of tuberculosis of the udder as disclosed in the slaughter-house and that discovered by clinical examination of the cows in the byres. If, however, it be assumed that the average residence of a cow in a byre is one year, and that the average cow population of the city byres represents the number of individuals which have been under observation throughout the year, a comparison of a kind may be made which may be used as a check on the work of clinical inspection. On this basis the incidence of tuberculosis of the udder, as disclosed by clinical examination in the city byres during 1921, was 0·66 per cent., or 1 cow affected in 152.

A further check on the efficiency of clinical inspection can be and is, maintained within the city. Independently of the clinical inspectors, samples of milk are collected on delivery from the producers and are subjected to the test of guinea-pig inoculation. So far as city-produced milk is concerned positive results have been very few in number, and with one exception the offending cow had been located by clinical examination and removed from the dairy herd several weeks before the report of the guinea-pig test had been received. In the exception referred to the animal responsible for infection showed no evidence of disease in the udder and no clinical symptoms of tuberculosis. She was ultimately located by a process of elimination with the aid of guinea-pig inoculations.

Infection of milk with tubercle bacilli will continue so long as tuberculosis exists in dairy stock, but efficient clinical inspection of milk cows at short intervals will very materially reduce the extent

to which infection prevails at the present time by ensuring the detection of the dangerous cow as soon as she develops clinical evidence of disease and her immediate removal from the dairy herd. More than this, however, is necessary. *The power to order the destruction of the cow in whose milk tubercle bacilli have been demonstrated is urgently required.* Existing conditions which permit these animals to be moved from one district in which inspection is efficient to another where there is no inspection are unsound economically. They permit the continuance of a menace to human health, whilst the cost of destruction, with compensation to owners, would be more than balanced by reduced expenditure on the care and treatment of a diminished number of human victims, with the added justification of saving a great amount of human suffering and anxiety.

HÆMORRHAGIC SEPTICÆMIAS IN ENGLAND.

By J. R. BARKER, M.R.C.V.S., D.V.H.,
Hereford.

HÆMORRHAGIC SEPTICÆMIAS have received scant reference from English writers, and it is with the object of focussing attention upon the lesions caused by the varieties of the bacillus *Bipolaris septicus* that the following preliminary account of clinical and bacteriological observations is made.

Annett divides the hæmorrhagic septicæmias into three groups :—

1. Pasteurella ... ... *The Plagues.*
2. Salmonella ... ... *The Pests.*
3. Nondescripts ... ... *The Septicæmias of Birds.*

It is with the first of these—the Pasteurelloses due to the bacillus *Bipolaris septicus*—that these observations are concerned. This group, according to the animal attacked and the variety of the organism found, has been divided as follows :—

1. Cattle ... ... *Bacillus Borisepticus.*
2. Sheep ... ... ,, *Orisepticus.*
3. Swine ... ... ,, *Suisepticus.*
4. Buffalo ... ... ,, *Bubalisepticus.*
5. Fowl ... ... ,, *Avisepticus.*
6. Horse ... ... ,, *Equisepticus.*
7. Rabbit... ... ... ,, *Cuniculisepticus.*
8. Man ... ... ,, *Pestis.*

and to these must be added

9. Hare ... ... *Bacillus Lepisepticus,*

recently reported in THE VETERINARY JOURNAL by Prof. Craig.

In cattle the disease seems to have many manifestations, and according to American writers may occur in the following forms :—

(*a*) Acute septicæmic form.
(*b*) Pulmonary or pectoral form.
(*c*) Intestinal form.
(*d*) Meningeal or nervous form.
(*e*) Cutaneous form.

All of these forms have been observed, but as only the pectoral has been submitted to Prof. Glynn, of Liverpool University, for confirmation of bacteriological findings, it is considered advisable to withhold publication of details of the other forms.

In the spring of 1911 an outbreak of hæmorrhagic septicæmia came under notice in the Craven District of the West Riding of Yorkshire, occurring in hand-reared, housed, dairy shorthorn calves.

The symptoms were ushered in by a rise in temperature and pneumonic evidences. Auscultation revealed an amount of exudate, and coughing soon caused this exudate, of a sago-like character, to be discharged from the nostrils. Intratracheal injections failed to alleviate the symptoms, and post-mortem examinations were made. At the same time an unopened calf was dispatched to Prof. Glynn.

The prevailing post-mortem appearance was lobar pneumonia, showing the distinct marking of pleuro pneumonia. Glynn isolated from the calf the bacillus *Bipolaris septicus*, and a vaccine prepared by him was injected into the remaining affected calves, and a second injection was subsequently made.

No further deaths took place, and, after a protracted convalescent period, all were reared.

The calf house was dismantled of its fittings, and, after thorough disinfection and a long period of rest, was again put into use.

Exact numerical details of this outbreak cannot now be recalled, owing to the lapse of time, but this was the beginning of an interest in the lesions caused by this bipolar staining organism.

Forty-three cattle, heifers and bullocks about eighteen months old, were imported from Ireland *via* Fishguard, and arrived in Hereford on April 20 of this year. Owing to the restrictions then prevailing these cattle were placed in a pasture under complete isolation from any cloven-hoofed animals.

On April 26 one of them, a heifer, was reported to the local authority as having been found dead. There were no evidences of foot and mouth disease, and a microscopical examination proved negative for anthrax. Nine or ten of the others were noticed to be unwell, lying apart, and walking with a stiff gait in front. On April 27 two more died, and a smear proving negative for anthrax, a post-mortem examination of both carcases was made.

The post-mortem appearances were recognised as those of hæmorrhagic septicæmia. This was rendered more certain on account of previous post-mortem examinations having been made of sheep in two outbreaks a few weeks prior, *viz.* (1) of an ewe, reported in *The Veterinary Record* by Aston, of Ludlow, and confirmed bacteriologically

by Dr. Ashcroft, of Liverpool; (2) of sheep, about to be reported here, and confirmed by Glynn.

The post-mortem appearances were hæmorrhages into the submucosæ of the small bowels, and reddening of the mucous membrane of the fourth stomach. There was pericardial fluid, slightly blood tinged, and hæmorrhages into the epicardium. These latter had the appearance as if flicked with a brush. The uncut lungs were hepatized, and showed foci about the size of half-a-crown, with a granite-like appearance. The liver was light coloured, fatty and friable. The spleen was slightly swollen.

On April 29 another animal died, and on post-mortem showed similar lesions.

The heart, spleen and lungs were forwarded to Prof. Glynn, who reported: "I have isolated a similar bipolar staining organism from the cow's spleen."

The remaining six animals, noticed to be clinically affected, were caught and drenched with lysol, chloroform and turpentine in milk, which drenching was repeated on May 1.

A clinical diagnosis of the pectoral form, the shipping fever as described in America, was made. These animals were coughing had the back arched, and showed a disinclination to graze and ruminate. There was a characteristic boiled sago-like discharge from the nostrils, and the mucous membrane of the mouth was reddened. A feature here noticed was an inclination to lie down near the hedges and ponds.

A vaccine of the organism isolated from the spleen was prepared by Prof. Glynn, and on May 11 all the thirty-nine surviving cattle were injected subcutaneously with 2 c.c. of an emulsion containing 20,000 million organisms.

On May 17 they received a second injection of the same amount.

When visited on May 17 the clinically affected showed distinct signs of improvement, and since then no further deaths have occurred, and all the animals are now to outward appearances in perfect health.

Maguire has reported the occurrence of hæmorrhagic septicæmia in Irish cattle, and the late Prof. Mettam's bacteriological findings confirmed the diagnosis.

These cattle from Ireland were noticed unwell on arrival in Hereford, and it is reasonable to presume that they were already infected with the organism, which is saprophytic. The shipping may have been the "third factor," enabling the organism to become pathogenous, and thus to produce the lesions described, and the deaths of four animals.

In sheep there would appear to be three recognisable forms, but they are not capable of very exact differentiation, except as to the

prevailing symptoms, and these are due to the variability of the virulence of the organism and the resistance of the animal.

The recognised forms, all of which have been observed, are :—

1. Acute septicæmic.
2. Pulmonary or pectoral.
3. Intestinal.

In the acute septicæmic form very rarely are any symptoms observed even by the most careful shepherd. In one of the outbreaks here recorded the owner was the shepherd, and seeing the flocks night and morning, and during the lambing season being constantly with the animals, yet the first thing noticed would be a sheep lying apart from the rest, and when approached, if not already dead, death would take place within an hour. This is the form which in cattle is by some writers called " bracken poisoning," and it is hoped later to furnish incontrovertible evidence of the lesions being due in cattle to a variety of this bacillus.

The outbreak now under consideration took place in the spring of this year, and an interesting fact is that on February 17 a heifer was found dead in one of the pastures to which the sheep had access. This death was reported to the local authority, and a microscopical examination for anthrax proved negative, but the presence of smaller organisms was noted in the smear. From this date onwards several sheep were found dead, and on March 30 a post-mortem examination of the carcase of one recently dead was made. The lungs were hepatized, showing grey centres, pneumonic foci, about the size of a penny. The heart showed petechiæ on the epicardium, and there was fluid in the pericardial sac. The liver was light coloured, fatty, and in the condition usually found associated with septicæmia. The bowels showed ecchimoses, and in the latter part the fæces were fluid—green diarrhœa just commencing.

A diagnosis of hæmorrhagic septicæmia was made, and the heart, lungs and spleen were sent to Prof. Glynn. Deaths continued to take place in all of the flocks, although they were composed of sheep of different ages, teggs, in-lamb ewes, and lambed ewes. No lambs were affected, and changing to roots, pasture, or clover did not have any effect.

A recently dead animal was secured and dispatched intact to the laboratory, reaching there on April 6. From each of these specimens the bacillus *bipolaris septicus* was isolated and vaccines prepared.

On Good Friday, April 14, a visit was made to the farm ; 104 sheep were then alive, eighteen deaths having taken place. Of these, 103 sheep were folded and received the first injection of vaccine—2 c.c. of an emulsion containing 20,000 million organisms. With

efficient catching and holding the whole injections from start to finish occupied one hour. Before rounding these sheep the owner remarked that one ewe, with a lamb, was lying under the hedge, and would probably be dead before we reached her, an event which had invariably happened when an animal had been noticed in this condition. This ewe when approached refused to rise without aid, was breathing heavily, and, when caused to move, did so with a stiff gait in the fore legs, and unless urged refused to proceed. She was given an injection of 10,000 million organisms and left out in the field.

All these injections of vaccine were made subcutaneously, under the skin of the neck, the wool being divided by the holder.

On Easter Monday the clinically-affected ewe seemed completely recovered, was grazing and cudding. She received on this date 20,000 million organisms subcutaneously.

On May 2 the owner noticed several of the sheep to be a little stiff in front and slightly soiled behind. Those showing signs of stiffness and slight diarrhœa were caught and given a second injection of 20,000 million organisms. Fifteen were so injected.

On May 5 one ewe died, but she was not one of the previous fifteen, nor the one clinically affected on April 14.

On May 6 eighty-eight sheep received the second injection of 20,000 million organisms, the fifteen injected on May 2 having been marked. No more deaths took place, and all the sheep have since done well.

It would appear that a single injection of the vaccine was sufficient to raise the animals' resistance slightly, for there was a passage from the acute form previously observed to the pulmonary form, and gradually verging into the intestinal form, with the onset of the green diarrhœa.

For prophylactic as well as curative purposes a second injection of the vaccine seems necessary to sufficiently raise the opsonic index, to enable the immunity of the animal to become established.

On May 5, 1922, another outbreak occurred on a farm of 20 miles from the previous one. In a flock of twenty ewes, with lambs, three ewes had been found dead at intervals, and never been noticed ill. The lambs were not affected. A post-mortem examination of the carcase of one was made, and the following appearances noted :—The liver was light coloured, fatty and friable. The fourth stomach showed pink areas, and ecchimoses were found in the small bowel. The lungs were hepatized and showed areas of grey hepatization. A diagnosis of hæmorrhagic septicæmia was made, and the seventeen ewes were given a vaccine of 20,000 million organisms, which was repeated on May 12.

On June 15 one ewe was reported to have died, but no post-mortem examination was possible.

It was the writer's privilege on March 20, 1922, to see the outbreak of the intestinal form, reported by Aston, of Ludlow, in *The Veterinary Record* of June 10, and to make a post-mortem examination of a carcase of one ewe, and the appearances were those of hæmorrhagic septicæmia.

In swine the disease seems to occur in two forms :—

1. Acute septicæmic.
2. Pulmonary.

The acute form would appear to produce death from the onset. This form has not been observed by the writer.

The pulmonary form seems to take a chronic course in pigs, and is identical with that described as swine plague by the Continental writers Hutyra and Marek.

The observed outbreak in swine seems to have some connection with cases seen in cattle and sheep occurring on the same farm.

In April, 1921, three heifers grazing in a pasture on this farm were noticed to be unwell, and two of them died suddenly. The post-mortem appearances were those of hæmorrhagic septicæmia.

In the spring of 1922 several ewes developed the intestinal form.

In 1920 two sows and a boar were purchased, and each female had two litters of pigs, which showed no signs of any disease. In September, 1921, one sow died farrowing. The other sow farrowed all right. This sow, and the boar, developed a cough, were breathing heavily, became unthrifty and wasted. They were both killed, and post-mortem examination revealed distinct lobar pneumonia and petechiæ spots on the epicardium. The litter from the second sow, without exception, developed the disease, and were decimated. The one surviving pig was killed and immediately forwarded to the laboratory. Prof. Glynn states : "The pig died of pneumonia. The organism is probably allied to the bacillus *Bronchisepticus*, and similar to those found in the other animals."

These observations would suggest that the bacillus *Bipolaris septicus* in its several varieties can become pathogenous for at least cattle, sheep and swine.

Having due regard to the specificity of the action of killed culture vaccines, the success obtained by their use supports this view.

The economic losses sustained must be on a large scale, and one would venture to say far in excess of those caused by more commonly recognised organisms, such as anthrax. Therefore it is not too much to expect that a more careful and detailed study of this organism as affecting stock in England would reveal these losses.

Clinical Articles.

A CASE OF ACTINOMYCOSIS IN A BOY.

By A. S. A., M.R.C.V.S.

THE great interest which has lately been taken in the diseases of animals contagious, or analogous, to man makes the following case in a human being worth recording in THE VETERINARY JOURNAL.

The patient, a lad aged 17, had been known to me during the last three years, being the son of a client. The parents were then fresh comers to this district, having previously been in Glamorgan.

The medical attendant gave as his opinion that the condition found by him on his initial examination was secondary infection, and thought that primary focus was situated in the trachea. I suggested to him that probably the eruption of one of the last molars might have been the site of infection.

The following notes were kindly sent to me, in reply to my request, by the boy's medical attendant :—

"I first saw the boy on May 4, 1920. Complained of sore throat.

On May 12 there was infiltrated swelling in the right anterior triangle of neck ; thought to be a deep-seated abscess. Temperature 101, pulse 100. Ordered to bed and hot fomentations applied.

On May 23 an incision was made under an anæsthetic. Diagnosis doubtful ; thought to be tuberculosis.

On June 8 operation by surgeon ; extensive dissection carried out in the neck. Diagnosis : Actinomycosis. Ray fungus not found in pus, but case considered suspicious and iodide treatment commenced.

July 17.—Further incision needed same side of neck.

By November 18 the wounds healed ; patient practically well ; regained flesh, but still had a slight cough.

January 1, 1921.—Patient not so well.

Disease broke out in the left anterior triangle, and subsequently, by direct extension, it spread to the occipital region. By this time the lungs were definitely involved, and at a later period local abscesses formed in the pleura and discharged between the ribs, later spreading downwards into the spinal muscles, with formation of multiple sinuses. The brain itself was affected by direct extension, and complete paralysis of the right arm followed. There was gradual loss of flesh and strength, bed sores formed later, and death took place by exhaustion. The patient was conscious right up to the end. Died on June 25, 1922. Duration just over two years. Fungus recognised after second operation. No vaccine treatment used. The fungus was detected in the sputum.

History.—In earlier life always chewing straws or grass."

I might mention, myself, as regards the disease (Actinomycosis) itself in the cattle of the district, that, although common, I had not attended a case on these particular premises during the past 20 years.

TRANSMISSION OF ANTHRAX FROM HORSE TO MAN.

By E. P. OWEN, M.R.C.V.S.,
Thame, Oxon.

I am unable to give the exact dates, but it was in 1909 that I was called in urgently to a sick horse, supposed to be suffering from strangles, of which disease I had had several cases on the same farm.

I found my patient suffering from acute dyspnœa, with the head very œdematous, and I at once inserted a tube into the trachea, which gave him temporary relief, but found that there was a certain amount of blood blowing through the tube. Some of this got on my arm, where I had a slight abrasion. The next morning I got a wire to say that the horse was dead.

This was on a Thursday. On the following Saturday night I had bad frontal headache, furred tongue, and thought I was sickening for a bilious attack. I took some aperient medicine. On Sunday I felt ill, and on Monday worse still, with fearful shooting pains down the spine and head. I then developed two pimples like flea bites, which were very irritable, and on Tuesday my arm was so tender that when a friend caught hold of me in the market I nearly fainted.

I went home and to bed early. I had rigors all over, and the next morning my arm had two places, each the size of a threepenny-bit, where the pimples had been. It looked like cheese-cake, well baked, with a ring of little glistening bubbles all round.

I went to a local doctor and told him what I suspected; he immediately sent a slide to London, and a telegram came down at 6 p.m. to say "Anthrax," and I was taken to Oxford Radcliffe Infirmary, where Dr. Parker operated and excised the part, and they managed to ring up London and get Sclavo's serum by the midnight train. I felt certain I was a dead man, and no doubt should have been but for the serum. The arm and leg and all that side of me had fearful pins and needles; the rigors were fearful. I had not eaten anything for two days, and just before we started to Oxford I had a brandy and soda, the only alcohol I had touched since the previous Friday.

I lay awake all that night, my breathing getting shorter, as if I had a string tied round me, but when they took my temperature the next morning, I could not raise the thermometer at all—of course, they did not let me see the chart.

It was the only case of anthrax they had had at the Radcliffe since I sent two men there in 1893, so all the Oxford doctors came to see me, especially on the Sunday after.

I made a rapid recovery, and was discharged in 10 days. I went away for three weeks, and then into Radcliffe again, when Dr. Parker kindly grafted some new skin on the part.

I suffer now a great deal from cramp, and always have done since. I certainly could find the serum working, or fancied I did. The pustules, once seen, are never forgotten. Dr. Parker knew them at once.

By F. L. GOOCH, F.R.C.V.S.,
Stamford.

I WAS summoned to a farm to give an opinion as to the cause of death on the carcase of a horse lying at the time in the stable. My suspicions were at once aroused, and I suspected anthrax, which was confirmed microscopically both by myself and the Royal Veterinary College. I found, on enquiry, that a cow had been killed about ten days prior, and the carcase sold for human food; also that a sow was found dead in the yard in which the cow was bled. Previously one horse had died and was skinned and sold for hound flesh to a horse slaughterer. Anthrax at this time was not a scheduled disease, and I informed the owner that the safest thing to do was to bury the carcase as it was, at least six feet deep; but after I had left the knackerman was sent for, and he said he would risk it, and also said he had given some of the flesh of the other dead horse to his dogs and they were all right. When I was summoned to another sick horse two days afterwards and found the other had been taken away, I saw the knackerman and cautioned him as to the consequences of getting any of the bacilli into his blood, but he took no notice of me, and removed the third carcase, with tragic consequences for himself, as he had a wound upon his arm, which became infected with the bacilli, and although a large piece of flesh was removed he eventually died from anthrax. This was certified by his medical attendant on his death certificate.

There were very interesting complications in connection with this outbreak in the contamination of a water supply and other deaths to animals on another farm.

ANTHRAX TRANSMITTED FROM COW TO MAN.

By F. L. GOOCH, F.R.C.V.S.,
Stamford.

LATE one evening I was called to a heifer in stall that the owner thought had broken its neck. They cut its throat and then sent for me about 12 p.m. They had their own butcher and slaughterhouse, so sent it there and made a I post-mortem examination in the morning, when, to my astonishment, I found enlarged spleen and diagnosed

anthrax, and the carcase was handed over to the local authority for cremation. The butcher had a slight scratch on his arm, and a few days afterwards he was very ill. His medical attendant pronounced it anthrax, and he was moved to Stamford infirmary, operated upon, and made a splendid recovery.

By HUGH BEGG, F.R.C.V.S.,
Chief Veterinary Surgeon to the County of Lanark.

Mr. A———, a farmer in Lanarkshire, had three animals die of anthrax.

The first case was not recognised, and was dressed and handled by a butcher and also by the owner.

The owner developed a local anthrax lesion in the cheek. This was surgically removed, and he received several doses of Sclavo's serum, being ill for some months, but finally made a good recovery.

By G. A. M. HARLE, M.R.C.V.S.,
Coldstream.

On May 29, I was called out to a farm 6 miles distant to see a bullock which had died suddenly. This bullock was fat and going with two other fat bullocks in an open court. Their feeding consisted solely of ground nut cake and hay. A microscopic examination of a drop of blood from the ear revealed anthrax. The carcase was cremated and all other precautions taken.

On June 19 I was called to the same farm, as a sheep had died on the 17th, another on the 18th, and several on the day on which I got the call. When I arrived I found that since the 17th there had been nine deaths (three ewes and six lambs). Microscopical examination again clearly indicated anthrax. All the dead sheep, including those which had already been buried, were cremated, along with the skin of the first sheep, which the shepherd had skinned. I found while there that the sheep had been removed on the previous day from the field where the deaths occurred to one on the other side of the farm. This did not affect the mortality, however, as on the 19th seven died, on the 26th two, on the 27th two, on July 3 one, and on the 5th one, making a total from the beginning of the outbreak of 15 sheep.

On June 19 the farmer admitted to me that on April 1 a fat bullock was found lying dead in the court in which our first anthrax case occurred. As it had a large wound in the chest, the farmer thought that it had been gored by another bullock, causing its death. The carcase was removed on a hay bogey and buried in the field where the first sheep died. At that time the field was full of sheep and

remained so for over a month. They were then removed to give them a change of pasture. The field was empty until the last week in May, when some of the same sheep were returned to the field, and these were the sheep which died.

On June 22 the shepherd noticed a small pimple on the back of his left hand. On the following day his hand became inflamed, and on the 25th, while on his way to church, he called on the doctor, to get something for it. The doctor (Dr. Henderson, Coldstream) after hearing particulars, took a smear of the blood, examined it microscopically for anthrax, and found it. So he sent the man to Edinburgh Infirmary, where he was under Dr. Dowden, a letter from whom I enclose :

48, Manor Place,
Edinburgh.
July 8, 1922.

DEAR SIR,—As to your request regarding some notes about I. Wight, I hope the following remarks may be of interest and of help. When Wight came in, his local condition was typical. A central dry black adherent area at the back of the forefinger with some blisters adjacent. There was, however, but little œdema, and the glands in the armpit were painful but not very much enlarged. His temperature was normal. He probably had naturally overcome the infection. I scraped the blistered area and applied pure liquid carbolic acid, and he steadily improved till his discharge, a short time ago, with the scabs still there and unseparated as yet. A film of fluid from the blisters showed the appearances compatible with anthrax, but no inoculation was tried, as the appearances were so typical.

I have seen several cases of anthrax, but never saw a death from the disease, and nowadays I generally touch the infected area with pure carbolic.

ANTHRAX COMMUNICATED FROM PIG TO MAN.

BY R. A. PHILP, F.R.C.V.S.,
Brentwood.

JUST recently a slaughterman in this district became affected with anthrax. He had killed and dressed three pigs which were ailing, and on the following day I was called in to see four other pigs which were fellows to the slaughtered ones. One of these four died in a few hours ; the remaining three recovered. Anthrax was confirmed in all the dead pigs.

A pustule developed on the man's arm three days after the time of slaughtering. He was dispatched to a London Hospital and anthrax

was diagnosed. The pustule and parts around it were excised and the man recovered.

I have also seen another instance where a man became affected with anthrax after skinning a beast that had died from anthrax.

COW-POX TRANSMITTED FROM MILKING CATTLE TO MAN.

By R. A. PHILP, F.R.C.V.S.,
Brentwood.

I HAVE seen this disease affecting men employed milking cows with cow-pox. In nearly all the instances I have seen the back of the hand becomes affected, the starting point appearing to be at an abrasion or a slight scratch on a knuckle. It incapacitates them for a time, and in some cases there is systemic disturbance. The milker appears to suffer more than the animal.

By F. L. GOOCH, F.R.C.V.S.,
Stamford.

JUST before the war I was summoned to examine a byre full of Lincoln red cows, and found the teats affected with cowpox. I was informed by the herdsman in attendance that they had had some similar cases previously. Before commencing treatment I explained, both to master and attendant, that the disease was contagious to man as well as from cow to cow, and instructed the man to milk all healthy cows first (or, better still, let someone else milk them) and then the diseased cow, and immediately upon finishing milking to thoroughly cleanse and disinfect his hands and arms. Although every precaution was apparently taken the disease spread until every cow in the shed became affected, and the man first in attendance developed the disease and had a very virulent attack that confined him to his home. He was medically attended for nearly three months before he was able to resume work. Another man contracted the disease in one arm, but the systemic disturbance was very slight, and he was able to resume his duties in a few days.

By HUGH BEGG, F.R.C.V.S.,
Chief Veterinary Inspector to the County of Lanark.

IT is well known that cow-pox of cattle is contagious to man, and the following, out of several which have come under my notice, is a typical instance.

It occurred in a herd of 30 cows, most of which had typical pocks on the teats.

Four milkers were employed and all of them developed typical

pox lesions between the fingers and on the backs of the hands. The symptoms were sufficiently severe to keep them from duty for several days, and the sores did not heal for about three weeks.

By E. J. THORBURN, M.R.C.V.S.,
Crewkerne.

During the summer and autumn of last year there occurred in this district, which is a large dairy one, several outbreaks of cow-pox amongst the milch cows. It is not my intention to describe the symptoms and treatment of this well-known complaint, but what I want to record is that, in one particular dairy, consisting of 60 cows (of which about 20 became affected), three of the milkers became very badly inoculated. In two cases the men were very ill, and were under medical treatment for a considerable time. Starting between the fingers the disease spread up the arm to the lymphatic glands and axilla, thence through the system to the glands in the lower extremities.

Several weeks elapsed before the men became completely convalescent.

A CASE OF TRANSMISSION OF FOOT AND MOUTH DISEASE FROM ANIMALS TO MAN.

By VINCENT BOYLE, M.R.C.V.S.,
Veterinary Inspector, Ministry of Agriculture.

It is not intended to deal at length with the occurrence of foot-and-mouth disease in the human subject in this note, but just to set out briefly the circumstances under which, in one instance, foot-and-mouth disease was contracted by the human subject through contact with affected animals.

An outbreak of foot-and-mouth disease occurred on a farm in Suffolk in November, 1920. The veterinary surgeon who dealt with the animals on the infected farm, and whose duty it was to examine each animal, was in contact with diseased cattle on four consecutive days, November 21 to November 24, 1920. On December 5 he fell ill, complained of headache and general malaise, and showed elevated temperature (101.4). On December 8 vesicles appeared on the inner surface of the lips, and on the gums above and below the incisor teeth, and during the following three days up to December 11 further vesicles formed on the hard palate and tongue. The general condition of the patient became worse, elevated temperature persisted, there were periods of delirium and semi-consciousness, and the heart had by this time become affected. The exact nature of the lesion I don't know, but I understand it was endocarditis, involving the valves, especially the aortic.

By December 25 an improvement had set in, and the lesions in the mouth healed gradually.

Improvement continued though convalescence was prolonged.

The exact method of infection is not clear, but probably it was through particles of saliva, shed epithelium, etc., contaminated with virus, reaching the face and lips of the examiner during the examination of the mouth lesions of the affected sheep.

With regard to heart lesions, I have noticed on post-mortem examinations of young bovines which had died, or were destroyed, owing to foot-and-mouth disease, that the valves on both sides of the heart were considerably thickened and showed extensive hemorrhages on their surfaces.

TRUTH ON FOOT AND MOUTH DISEASE CONTAGION IN AUSTRIA.

Foot and mouth disease has long been rampant all over Austria. You see cattle in all sorts of horrible states staggering down to the butchers. The weak Government exercises no control; indeed, the local authorities either include the butcher or fear him. If they vote for bad meat, he will vote for bad bread or sanded sugar and adulterated wine. Human beings are catching the complaint in appalling numbers. Their symptoms are the same as those of the animals—streaming eyes and nostrils. Then great sores appear on the lips, just like some big insect boring a deep hole, and scars remain for life. Prudent people have given up eating beef altogether, and an edict has gone forth forbidding them to walk in the woods near the Lake of Constance lest they should be infected.—*Truth*, August 23, 1922.

TRANSMISSION OF GLANDERS FROM HORSE TO MAN.

By Major M. P. WALSH, R.A.V.C.,
Woolwich.

In 1917, whilst serving in India, I was working in the Divisional Laboratory in Peshawur in connection with an R.A.M.C. officer. One day he received smears taken from the lungs of a drabi, or native driver, who died of pneumonia, but certain symptoms rather puzzled the M.O. in charge, as he was not quite sure what the bacilli found on staining were.

I examined them with him, and with a few differential stainings glanders bacilli were demonstrated. I found out that the native belonged to a mule corps, and I went to the corps to inquire into the matter.

The native Salutri was not very *au fait* with glanders, and had

treated some mules for septicæmia and debility; these cases were glanders, and the drabi who died was looking after one of them.

Prior to the war, in India veterinary officers did not attend horses in certain native units unless called in on an outbreak of contagious diseases or to see a serious case.

By R. A. PHILP, F.R.C.V.S.,
Brentwood.

Some years ago, when practising in the East End of London, the following instance of the transmission of glanders to man came under my notice.

A man, who was looking very ill, asked me to look at his leg, his statement being that he had just been discharged from hospital after being there under treatment for three weeks. He stated that at the end of this time he was asked what his calling was, and when he replied that he was a horse-keeper he was told that, as he was affected with glanders, he could not remain in that particular institution any longer as contagious diseases were exempted.

I gathered in conversation with him that one day, whilst giving a horse with a nasal discharge a draught of medicine, the animal coughed and blew some of the discharge on to his face. A few days afterwards sores broke out about the lips and nose and he was affected with intense sickness, which lasted throughout his illness. The facial lesions apparently cleared up, but his left leg became swollen and ulcerated in several places. The horse which he had given the draught to was destroyed, and, on post-mortem examination, proved to be glandered.

I advised the man to seek the Poor Law Authorities, and from that time lost sight of him.

GLANDERS IN MAN FROM EATING INFECTED HORSEFLESH.

By DR. HENRY PODGAEZ, M.R.C.V.S.,
Doctor of Veterinary Science, and Doctor of Agriculture in the University of Kharkov, Russia.

In July, 1920, when I was compulsorily acting, by orders of the Soviet Government, as attendant in a medical hospital at Karkov, in the Ukraine, Russia, there were some twenty of the Red Army soldiers in the wards suffering from glanders, contracted by eating infected horseflesh.

The diagnosis was made by the medical bacteriologists at the Kharkov Bacteriological Institute and confirmed by sero-biological tests.

Under secret orders from headquarters these men were removed

to a prison, where, on the pretext that they were all deserters, they were shot.

Such is an instance of the "summary" and "humane" methods adopted by the Bolshevist.

TRANSMISSION OF EQUINE SCABIES FROM HORSE TO MAN.

By Lt.-Col. COCHRANE, C.B.E., F.R.C.V.S.,
Royal Army Veterinary Corps, Woolwich.

During the South African War, when I was in charge of the Veterinary Hospital at Middelburg, Transvaal, there were some cases of skin disease diagnosed as scabies amongst the forge staff, and considered to be communicated to them from horses suffering from that disease.

The number of animals in the hospital was generally over 1,500, and at one time reached 2,200. The large majority of these were cases of scabies, combined with debility.

The conditions which existed in the veterinary service during the South African War differed greatly from the conditions under which this service worked in the Great War.

There was no Veterinary Corps personnel to staff the veterinary hospitals in that country excepting a few farrier quartermaster-sergeants on the Indian Subordinate Establishment, and the staff of these hospitals were a mixture of soldiers lent from regimental duty and civilians of all nationalities, none of whom had any training in the nursing or care of sick animals or the precaution necessary to prevent the spread of contagious diseases. Under these circumstances, and bearing in mind the fact that hospitals were greatly understaffed in veterinary officers, it will be understood that detailed supervision was impossible.

When mange was at its height the senior farrier reported to me that some of the men in the forge were suffering from a rash and from intense itchiness.

I inspected the forge staff, which consisted of about a dozen farriers—soldiers, Englishmen, Dutchmen, and one Russian Jew. Three men had a pronounced reddish eruption over their backs varying in degree, and all suffered from intense itchiness. The Russian Jew was much the most severe case. It was ascertained he had a rooted objection to washing, and therefore was a very suitable subject for the development of this disease.

The cases were reported to the medical officer, who diagnosed them as scabies, and took the usual steps to cure them and preventive measures to arrest further spread of the disease. The men were quickly returned to duty, and, with a recognised system of preventive

measures, there were no more outbreaks of scabies amongst the men in the forge.

Owing to the lapse of time I am unable to state whether the medical officer confirmed his diagnosis by examinations of scrapings under the microscope; at least 80 per cent. of the cases of scabies in the Veterinary Hospital were of the dermatodectic variety, but probably this infection was of the sarcoptic variety.

The man who was most severely affected had an eruption from his neck all the way down his back, and, having rubbed and scratched it, had made the eruption worse.

Naturally I did not go into details over the cases, but handed the men over to the medical authorities and took steps to prevent further infection, which I considered was incurred by the men in the forge handling horses suffering from scabies.

The forge staff were divided into those men shoeing clean horses and those shoeing horses affected with scabies, and only men attending to the latter cases were affected.

By J. RUSSELL GREIG, M.R.C.V.S.,
Professor of Medicine, Royal Veterinary College, Edinburgh.

A LIGHT draught aged gelding was admitted to college hospital in an advanced condition of generalised sarcoptic mange.

A groom and the present writer both contracted slight scabies from the animal.

As it was considered advisable from an economic standpoint to discontinue treatment the horse was destroyed and the body was made use of for the class of surgical anatomy. About twenty students were in more or less close contact with the carcase for periods which varied from a few minutes to two hours. About 60 per cent. of them became affected with scabies. In one case severe itchiness was observed 15 minutes after contact. In another severe generalised symptoms were shown. It is interesting to note that this individual had contracted severe generalised scabies from his nurse when an infant—apparently a case of susceptibility.

TRANSMISSION OF SARCOPTIC MANGE FROM CAMEL TO MAN.

BY GUY SUTTON, F.R.C.V.S.,
Late Major, Royal Army Veterinary Corps.

MANY men of the Imperial Corps became badly affected with camel mange in Egypt and Palestine during the late war, close contact with their mounts being inevitable in the case of troops operating in the field.

The outbreak became so severe that the Brigade had to be withdrawn to a camp, and there and then a large percentage of their camels were sent into hospitals, the men being supplied with remounts when their own outbreak had ceased.

Mange is very prevalent in camels during the cold season, when the coat is long. The Bedouin and Indian Frontiersman know the disease well, and treat it, but the climate will not allow wholesale clipping, and usually only the worst patches receive attention. The saddle pads are probably never dressed.

By Capt. V. A. BARTRAM, M.R.C.V.S.,
Royal Army Veterinary Corps.

A NUMBER of cases of camel mange occurred amongst the men in the Australian Battalion of the Imperial Camel Corps in Palestine, in 1917-18.

At the time these men were employed on patrol and reconnaissance work in an area where water was very scarce, rendering washing almost an impossibility.

Infection probably occurred through the men's blankets hanging down from the saddle and rubbing against the animals' bodies whilst on the march.

The infection was generalised, and the men suffered from intense irritation, which prevented them from sleeping.

On admission to hospital, however, the disease yielded quickly to treatment.

The infected camels were segregated and sent to a camel veterinary hospital, where they were treated and kept until cured.

TRANSMISSION OF SARCOPTIC MANGE FROM DOG TO MAN.

By J. RUSSELL GREIG, M.R.C.V.S.,
Professor of Medicine, Royal Veterinary College, Edinburgh.

A NURSING mother, about 30 years of age, brought a rough-haired terrier to the college out-patient department for advice. The animal was suffering from generalised sarcoptic mange of several weeks' standing.

The owner stated that she herself had been suffering from an itching papular rash on the chest, which had been in existence for about 14 days; the infant was also similarly affected on the right ear and cheek. Her complaint had been diagnosed by a medical man as a non-parasitic skin affection. She stated that she had frequently held the dog to her naked chest, and that she habitually wore a "low-necked" blouse. The eruption was typical of scabies as it occurs in

the human. Upon the application of a simple parasiticide lotion (one part of Balsam of Peru in eight parts of Spts. Vini Meth.) the eruption quickly disappeared.

By Major M. P. WALSH, R.A.V.C.,
Woolwich.

In 1914 I purchased a Pomeranian pup without previously seeing it and had it sent home. My sister wrote me and said it was losing its coat in patches and very itchy. She washed it in carbolic soap, etc., and it did not improve. About a month afterwards I went home on leave and found that the dog had every symptom of mange, and that my sister had lesions on the backs of the hand and arms, very itchy, and also typical of mange.

Treatment in warm antiseptic solution and Ung. Sulph. sufficed to cure these patches. I have not any doubt but that the disease was contracted from handling the dog.

TRANSMISSION OF SARCOPTIC MANGE FROM DOG TO MAN.

By STANLEY NOBLE, M.D.,
15, *Cavendish Place, W.*

A few months ago a client of mine purchased a Yorkshire terrier puppy, five months old, which, after a few days, developed a skin irritation. As there were no noticeable spots or abrasions a worm dose was administered and the dog was kept under observation. This dose had a good effect, but the irritation still continued, and eventually the little dog was taken to a veterinary surgeon, who at once diagnosed sarcoptic mange. The whole body was then dressed with the usual oily mange dressing, which gave ease immediately, and eventually effected a cure in three weeks.

My client, a lady, had nursed the dog on numerous occasions, and developed a rash about 10 days after becoming the owner of the animal on the neck, chin, arms and chest, each part affected being frightfully irritable. Her description of it was that she had a " rash " with small red pimples, for which she took a sulphurated potash bath each day for seven consecutive days, which rather overdid matters and caused a dermatitis. This, however, eventually yielded to lead and calamine lotion, and, as the dog was not handled or nursed again until quite cured, there has been no reinfection.

By E. J. KENNEDY, M.R.C.S., D.P.H.,
Indian Medical Service.

The following is an instance of the communicability of sarcoptic mange from a dog to the human species, and came under my own personal observation.

A toy Yorkshire terrier, 4 months old, became affected with an irritability of the skin which was diagnosed by a veterinary surgeon who makes a speciality of canine diseases as sarcoptic mange.

On one occasion, shortly after purchase, when the little animal was very restless and whining continually, the owner took it on to the bed about 3 a.m., and allowed it to crawl under the bedclothes, where it made itself comfortable and very much at home in close contact with the owner's abdomen.

At 7 a.m. the owner found the surface of the skin of the abdomen covered with a distinct and irritable rash.

On the following day a similar rash appeared on the left side of the owner's thorax, and two days later different crops appeared about the legs and arms. His wife had also handled the dog continually, and her skin became exceedingly irritable. This, too, I had no difficulty in diagnosing as being due to the canine sarcopt.

The dog was sent to a veterinary hospital, and the two human patients were treated with sulphur preparations, which gave relief at once, and eventually terminated in a cure.

A CASE OF FOLLICULAR MANGE TRANSMITTED FROM DOG TO MAN.

By W. F. MAYNARD, M.R.C.V.S.,
Romsey, Hnats.

My brother, the late Mr. Arnold Maynard, M.R.C.V.S., of Bournemouth, contracted follicular mange on the face from a dog, about ten years ago. The parasite was examined for microscopically and found. Treatment was prolonged, and lasted over several weeks, but eventually a complete recovery was made.

A CASE OF SCABIES TRANSMITTED FROM CAT TO MAN.

By G. H. LIVESEY, M.R.C.V.S.,
Hove, Sussex.

From a large number of cases of scabies transmitted to man from the cat or dog I select the following as typical :—

Small discrete papules developed in the legs of a gentleman, causing intense itching, and rapidly becoming vesicles. The vesicles were about the size of a small pin's head, and contained a very small quantity of slightly turbid fluid. The itching did not cease when the vesicles ruptured. The lesions were not symmetrical, and were scattered about the legs and thighs, the front of the thighs being particularly affected. The disease spread to the trunk, chest and shoulders, with one or two papules on the flexor surface of the arms. The back was not affected.

Various remedies were tried, with little success. But sulphur ointment and sulphur baths were persisted in, and the disease disappeared in about five weeks from the time it was first noticed.

No "Lines" or sub-epidermal galeries could be seen, and no parasite found for identification. The diagnosis was made from the appearance and course of the lesions, and from the fact that there was an old cat in the house with typical scabies of the head and back of the neck, and from which the parasite was identified. The disease had evidently been transmitted by the cat rubbing against the owner's legs. The lesions in the cat soon disappeared under appropriate treatment.

The scabies affecting the man differed in this case from many cases of scabies affecting man and transmitted from the dog, and probably this is because the parasite of the cat is different from that of the dog and the lesions and course of the disease in these two animals are quite different. In the case I have just reported the papules were scattered and sometimes widely separated. The vesicles were quite small, hard, much distended, and pearly or opalescent when viewed under a hand glass, and there was only a very small inflammatory area round each.

In cases transmitted from the dog I have noticed that the disease is confined as a rule more to one area, and is often of an erythematous nature and vesicles are uncommon, and in some skins "galleries" or "lines" can be demonstrated; the canine type is easily and quickly subdued by treatment with sulphur.

A FATAL CASE OF RABIES IN MAN.

By B. SCOTT FRITZ,
Agent in Charge, Pennsylvania Bureau of Animal Industry, Philadelphia, Pennsylvania.

THE head of a dog suspected of rabies was sent to the laboratory of the Pennsylvania Bureau of Animal Industry May 19, 1922, by Dr. Edgar W. Powell, practising veterinarian Bryn Mawr, for diagnosis. The laboratory diagnosis was positive.

History.—On May 14, 1922, a white beagle dog with brown ears, the owner of which was not known, in the vicinity of Ardmore, bit a child badly about the face. The father of the child that was bitten, being familiar with the danger accompanying a dog bite, informed the police of Ardmore of the case, who caught the dog and turned it over to Dr. Powell, who in turn held it under observation. On May 19 the dog showed clinical symptoms of rabies and was killed, and the head was forwarded to the above-mentioned laboratory for a confirming diagnosis. The laboratory diagnosis was positive to rabies, and the parent of the child bitten was notified by telephone. An attending

physician was called and the Pasteur treatment was given. The treatment, so far as we know to date, was successful.

On June 5 a physician at Villa Nova College called this laboratory, requesting of us any history of rabies in that vicinity. We informed him of the above-mentioned case as cited. He in turn informed us of having under his observation a student at the college showing symptoms of which he was suspicious of rabies, and stated that if he could associate rabies with a bite this student had received on May 14 a diagnosis of rabies would be certain.

By investigation through our Bureau, the attending physician and the Ardmore Bureau of Health, it was proved that the dog which had bitten the child also bit the student, on the same date. The student saw the dog lying in the gutter on the morning of May 14, in Ardmore, and thinking the dog had been run over by an automobile, stopped to pet it, and the dog jumped up and bit him on the lip. The student not being alarmed by the nature of the bite, had the wound cauterised and forgot the incident until being brought under the observation of the physician.

On June 7 the student died, showing typical symptoms of rabies. The student's brain was brought to our laboratory and the physician's positive diagnosis of rabies was confirmed.

Conclusion.—Observe from the case cited that the dog bit the child and the student about five days before having shown clinical symptoms. The Pasteur treatment was given the child immediately after the date of the laboratory diagnosis of rabies in the dog. The student did not receive antirabic vaccine, and showed symptoms of rabies in about twenty-one days after the date of the bite, and died on the twenty-third day. A positive diagnosis of rabies was made in our laboratory.—*Journal of the American Veterinary Medical Association*, August, 1922.

RINGWORM TRANSMITTED FROM CALVES TO MAN.

By P. R. TURNER, M.R.C.V.S.,
Bury St. Edmund's.

I HAD been treating some calves for husk and at the same time dressing them for ringworm. About four days afterwards my man found two or three small pustules in a group on his left forearm. They gave rise to a certain amount of irritation, but it was not until they had increased in number that he took any particular notice. He then, on my advice, painted the area with Tinct. Iodi B.P. every day. This seemed to have no good effect at all. In fact, the pustules spread to such an extent that at the end of about a fortnight the area which they covered was the size of a five-shilling piece. I then gave him Liquor Iodi B.P. to apply alternately with petrol. This

did not seem to have any beneficial effect either. Eventually he took it into his own hands and applied the usual blister ointment (which I often use for ringworm in bovines), *viz.*, Ung. Hyd. Biniodid 1—8, and this effected a cure in a very short time. A very salient point in this case is that during his infection his son, a lad of 12 years, contracted a similar place on his arm, probably from using the same towel. This took a similar course to his father's.

I might say that during the treatment with iodine the periphery of the area seemed to die, but there was always a pustular erythema in the centre. Another point that I observed was that it remained localised on both patients.

By F. MORTON WALLIS, M.R.C.V.S.,
Leigh-on-Sea.

In 1886 I was injecting intertracheally some calves who were suffering from hoose. The calves had ringworm, and I caught this disease on my arms, and as my local doctor could not stop it from spreading, I was sent up to a London specialist, who gave me a prescription which quickly put me right.

During the war three girls and two married women, who were attending to the animals on a farm where a score of calves had ringworm very badly, caught it and became severely infected.

By W. F. MAYNARD, M.R.C.V.S.,
Romsey, Hants.

I myself contracted ringworm on one arm, after dressing some calves suffering from the complaint, about twelve years ago. It took three months to cure. All the usual remedies were tried under medical supervision, but nitrate of silver proved to be the most successful application.

By ERIC SAVELL,
Estate Office, Benham Court, Newbury.

In November, 1921, I had a big outbreak of ringworm amongst some calves on one of the farms under my charge, and, being anxious to get them cured as quickly as possible, I undertook to do the dressings personally, applying an emulsion which was given to me by Major Barron, M.R.C.V.S., for the purpose. I took especial pains after dressing each patient to wash my hands in strong creolin disinfectant, but unfortunately forgot to remove my ring.

About a week after the first application I noticed an irritation and redness under the ring finger of the left hand.

I painted this with iodine and then consulted a local doctor. He gave me some iodine ointment, but this did not give rise to any benefit. He then gave me a lotion which I assiduously applied, and in six weeks the finger was all right.

By F. L. GOOCH, F.R.C.V.S.,
Stamford.

My own son, then a veterinary student at the Royal Veterinary College, was assisting me two years ago to reject the tracheæ of a number of calves for "husk." Several of these calves had ringworm about their heads and bodies, and, although every precaution was taken immediately after the operation in the way of washing and cleansing, my son contracted the disease on his left arm, and had three or four well defined ringworms.

I have seen, without exaggeration, dozens of herdsmen who have contracted ringworm from cattle, either when handling them or, in some instances, when dressing the ringworm with an ointment.

RINGWORM TRANSMITTED FROM CAT TO MAN.

By G. H. LIVESEY, M.R.C.V.S.,
Hove, Sussex.

I was asked to examine very thoroughly a young cat and give an opinion as to whether it was perfectly free from skin disease. My opinion was sought on the advice of the family doctor.

The cat was a particularly pretty silver Persian tabby, with very engaging ways, and was a great pet. The examination failed to reveal any sign of disease, the cat being apparently in perfect health and in very good coat. No reason was given to me for the request for my examination.

Within three weeks I developed Tinea Circinata on the left wrist, and several other lesions developed on subsequent days, but quickly responded to treatment. At the same time my wife, who had seen and handled the cat, developed lesions which were quickly cured.

Some months later, when conversing with a well-known dermatologist, I told him of the case, and he informed me the owners of the cat had been under his care for Tinea. Five persons in that home had been affected. The cat had been to two veterinary surgeons, who reported it in perfect health. It had been given away, and in its new home six more people had been affected with Tinea.

He had then examined the cat himself, but found no microscopic

evidence of disease. On plucking out hairs from behind the ear, however, he had found Tinea spores in the hairs (but no sheath on the shafts) on microscopical examination.

In all fifteen people had been infected by this cat. Eventually the cat was destroyed. The interest in this case lies in the fact that there was no sign of disease to the naked eye, and in such cases it is difficult to be certain as to the source of infection. I may say that the cat at no time had shown any signs of skin irritation, or baldness, or scurf, or discolouration.

NOTES ON SOME DISEASES COMMUNICATED FROM ANIMALS TO MAN.

By H. D. SPARROW, M.R.C.V.S.,
Rochford, Essex.

Ringworm from Calves.

Ringworm was contracted from calves by myself on left forearm, one lesion, in 1913. Also by my brother on head (1919). Cured by tincture of iodine. We have met many cases in stockmen and their children.

Ringworm from Dog.

A lady was being treated by a local doctor for eczema. Called my father in during the war to examine her dog ; he was shown lesions on the owners and three friends, which he considered to be also ringworm. When Dr. B—— was informed that the dog had ringworm he altered his diagnosis, as previously he had been at a loss to understand how such clients as these ladies were could have caught ringworm.

Mange from Horse.

The yardman of a firm of contractors clipped, washed, dressed, etc., until cured, a horse suffering from sarcoptic mange in 1920. He caught the disease, which developed as a very irritable rash on his breast and arms, which caused a great deal of irritation, lasting about a fortnight. He treated himself with the horse's skin dressing containing paraffin, turpentine, McDougall's sheep dip, rape oil, and water.

Mange from Dog.

A lady visitor at an Hotel near here, the wife of a medical man, called my father to examine and treat a dog which slept in her bed. He diagnosed sarcoptic mange, and was shown lesions on the lady's chest and arm, which were very irritable and due to mange caught from the dog.

Cowpox.

This disease is often met with in milkers in the country. One of the worst outbreaks I have known occurred at a large dairy in our practice in 1912. Practically the whole herd of about forty cows

had the disease, complicated by suppurative infection due to the insanitary condition of the yard, the cows having to wade more than knee-deep in dung juice, which interferred with treatment and retarded healing. Most of the milkers caught cowpox with lesions on their arms and hands ; probably mostly cases of mixed infection, and had to be medically treated.

FOOT-AND-MOUTH DISEASE (RUMOURED).

About 1880 a shepherd was stated by himself and many others to have caught foot-and-mouth disease from sheep, and whatever the disease may have been it left him with permanently thickened lips.

FARCY OR GLANDERS.

A man in our neighbourhood was scratched by the teeth of a horse suffering from the farcy form of glanders. He became infected with glanders, and eventually died of this disease.

Review.

INDEXED SYSTEM OF VETERINARY TREATMENT. By WILLIAM SCOTT, F.R.C.V.S., with the collaboration of various writers. Pp. 636, with 195 illustrations. Price 31s. 6d. Published by Baillière, Tindall & Cox, London.

NOWADAYS, when specialism is so universal, and the subjects of veterinary science are as wide in their respective spheres, and almost (if not quite) as exact as those of their sister in human medicine, it is a stupendous task for any one author to endeavour to collect together in one volume the full details and facts of every disease which animals are heirs to. In fact, it is almost impossible, but the college student and practitioner alike of to-day need a compendium from which to make handy reference, whether, as in the case of the former, for examination purposes, or, in the case of the practitioner, in order to get in a moment and in concise form a summary of the latest up-to-date treatment of an abstruse and unusual case.

In endeavouring to supply this want the author of the " Indexed System of Veterinary Treatment " has done excellent work and usefully filled a gap. Recognising that no man can be an authority upon every ailment or upon every operation, Mr. Scott has very wisely gone to authorities on certain subjects, and they, too, are to be congratulated on the way they have supplied condensed chapters upon their own individual specialities. Diseases and ailments are taken alphabetically, a convenience which makes them readily found, and

the author has bestowed infinite pains to omit nothing which the practitioner is likely to come across in his daily round. This, too, is an advantage to the student who is preparing for an examination, and amongst the colleges the book should be especially appreciated. The type and style put into the work by the publishers show that bookbinding and printing have quite returned to pre-war quality, and in this respect there is nothing left to be desired.

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